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**SPECIAL ADVANCED STUDIES FOR
POLLUTION PREVENTION**

**Delivery Order 0065: "The Monitor" –
Fall 2000**



**Science Applications International Corporation
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STINFO FINAL REPORT

**MATERIALS AND MANUFACTURING DIRECTORATE
AIR FORCE RESEARCH LABORATORY
AIR FORCE MATERIEL COMMAND
WRIGHT-PATTERSON AIR FORCE BASE, OH 45433-7750**

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THIS TECHNICAL REPORT IS APPROVED FOR PUBLICATION.

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The MONITOR is a quarterly publication of the Headquarters Air Force Materiel Command (AFMC) Pollution Prevention Integrated Product Team (P2IPT) dedicated to integrating environment, safety, and health related issues across the entire life cycle of Air Force Weapon Systems. AFMC does not endorse the products featured in this magazine. The views and opinions expressed in this publication are not necessarily those of AFMC. All inquiries or submissions to the MONITOR may be addressed to the Program Manager, Mr. Frank Brown.



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OVERVIEW OF THE ENVIRONMENT, SAFETY AND OCCUPATIONAL HEALTH (ESOH) REVISIONS TO DEPARTMENT OF DEFENSE (DOD) 5000 SERIES

A Department of Defense (DoD) Acquisition Environment, Safety, and Occupational Health (ESOH) Integrated Product Team (IPT) is rewriting the ESOH portions of the revised DoD 5000 series documents and the accompanying Acquisition Deskbook. This IPT will retain control of the ESOH portion of the Deskbook. DoD signed out the revised DoD Directive (DoDD) 5000.1 and the new DoD Instruction (DoDI) 5000.2 on 23 October 2000. In addition, DoD also signed out on 23 October 2000 an interim version of the DoD Regulation 5000.2-R with the ESOH sections essentially unchanged from the current DoD 5000.2-R ESOH language. However, DoD is working on an extensively revised version of DoD 5000.2-R. The following provides a summary of the ESOH requirements in the new DoDD 5000.1 and DoDI 5000.2 and a summary of the proposed ESOH requirements in the revised DOD 5000.2-R (still undergoing revisions).

ESOH Requirements in DoDD 5000.1, 23 October 2000

DoD 5000.1 includes ESOH considerations along with the other considerations in a Total Systems Approach (section 4.4.1).

ESOH Requirements in DoDI 5000.2, 23 October 2000

1. Beginning with Milestone B, Programs will have to provide, in support of each Milestone Decision, the schedule for completing all reasonably foreseeable National Environmental Policy Act (NEPA) documentation, regardless of what organization is the proponent for the proposed action requiring formal NEPA documentation. This completion schedule should cover the whole life cycle, to include Concept Demonstration testing (Program Office is proponent), Developmental Testing (Program Office is proponent), Operational Testing (AFOTEC would be the proponent), and Basing (Operational or Training Command would be the proponent). The Program should integrate this NEPA completion schedule into its Master schedule. The intent is to encourage Programs to assess, early in the development process, any potential ESOH limitations or constraints on system testing, training, and fielding. See sections 4.7.3.2.3.1.5 and 4.7.3.3.3.1.1 and Enclosure 3 of DoDI 5000.2.
2. The Program's sustainment strategy must address ESOH considerations, to include demilitarization and disposal requirement. (See section 4.7.4)
3. The definition of Total Ownership Cost (TOC) includes ESOH considerations. (See Enclosure 2)

ESOH requirements being proposed for inclusion in the revised DOD 5000.2-R

The revised DoD 5000.2-R is likely to include the following changes to the ESOH guidance:

1. The Programmatic Environment, Safety, and Health Evaluation (PESHE) will be a stand-alone document required of every Program. *{New requirement}*
2. The PESHE will have to address the following four items:
 - Program's strategy for integrating ESOH considerations into the systems engineering process
 - Program's assignment of responsibilities for integrating ESOH considerations.
 - Program's process for tracking progress in integrating ESOH considerations.
 - Program's significant (High, Serious, or Medium) ESOH risks *{New requirement}*
3. Programs will have to provide the PESHE as part of the Milestone Decision IPT process. *{New requirement}*
4. The PESHE will have to include, for presentation at each Milestone Review, the schedule for completing all reasonably foreseeable Program National Environmental Policy Act (NEPA) documentation, regardless of what organization is the proponent for the proposed action requiring formal NEPA documentation. *{New requirement established in DoDI 5000.2}*
5. A Program's system engineering process will have to address the following ESOH elements, using the MIL-STD-882D methodology to identify and assess ESOH risks:
 - NEPA
 - ESOH compliance *{vice just referring to "Environmental Compliance"}*
 - Safety and Health *{vice System Safety and Health—System Safety, as defined in MIL-STD-882D, is not included as a Safety discipline, but as a methodology for ESOH risk assessment.}*
 - Hazardous Materials
 - Pollution Prevention
 - Explosives Safety *{New requirement}*

- Legacy system ESOH hazards {New requirement to encourage Programs to look at the systems being replaced and/or being modified to get operator inputs on what the existing ESOH hazards or concerns are.}

Roadmap Overview

Figures 1 through 5 present roadmap guidance to the proposed revisions to the existing components of DoD 5000.2-R, namely ESOH Compliance, Pollution Prevention, System Safety and Health, Hazardous Materials, and National Environmental Protection Act (NEPA). The roadmaps identify the Air Force regulatory drivers as well as the key considerations that a Program must undertake in each area.

For more information regarding the revisions to DoD 5000 series or the information presented in this article, please contact Lt. Col. Sherman Forbes at SAF/AQ at DSN 425-7839.

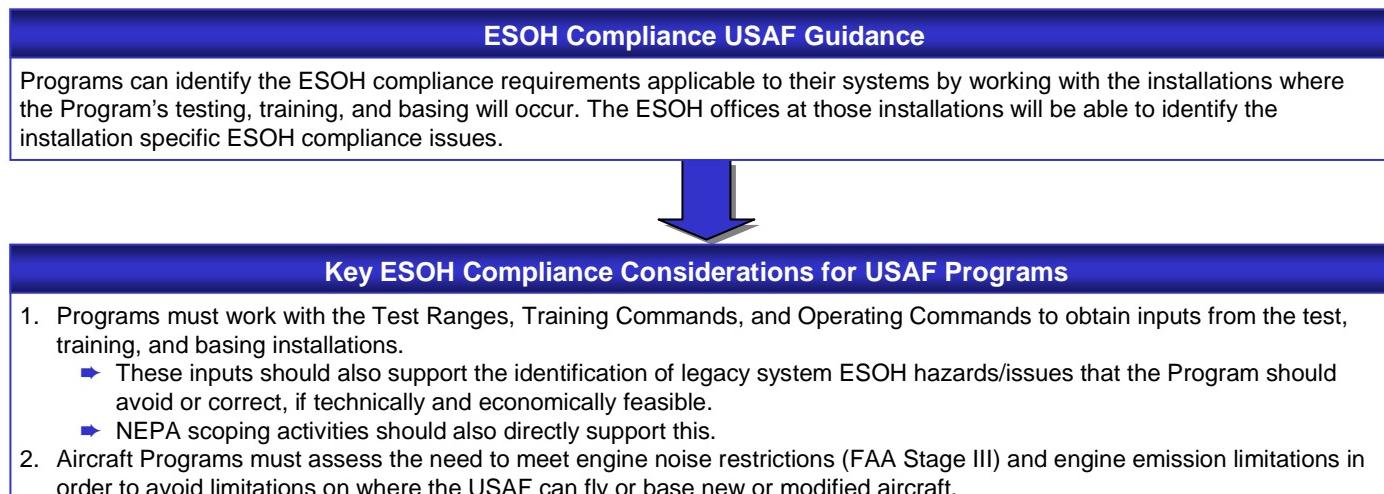


Figure 1. Roadmap for ESOH Compliance Requirements Under DoD 5000.2-R

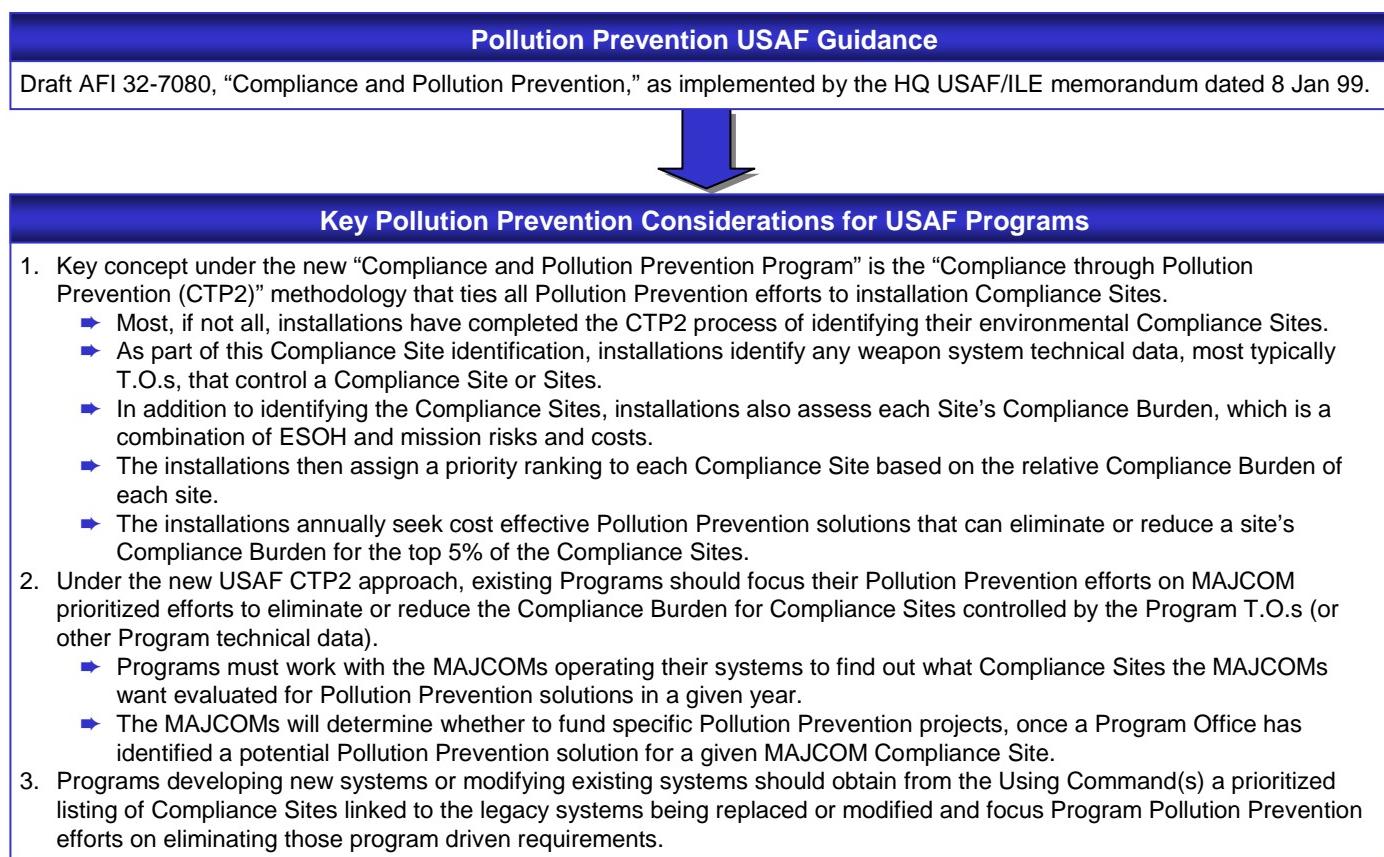


Figure 2. Roadmap for Pollution Prevention Requirements Under DoD 5000.2-R

Safety and Health USAF Guidance

1. MIL-STD-882D, Standard Practice for System Safety, an ESOH risk management methodology, not an ESOH "consideration."
2. AFI 91-202, "USAF Mishap Prevention Program," Chapter 9 (System Safety).
3. AFI 90-901, "Operational Risk Management," especially paragraph 5.12 (Single Manager responsibilities).
4. AFI 63-1201, "Operational Safety, Suitability, and Effectiveness," especially paragraphs 1.1 (Disciplined Engineering Process elements) and 2.8 (Single Manager responsibilities).
5. AFPD 62-6, "Air Worthiness Certification" (**dated 01 Oct 2000**).



Key Safety and Health Considerations for USAF Programs

1. Since MIL-STD-882D is a "Standard Practice" document, Programs can put it on contract without a waiver to the SAF/AQ Policy 99-1, "Using Specifications and Standards."
2. Programs should identify legacy system test, training, and basing locations' safety and health concerns.
3. Programs should maintain record of safety and health hazards in the System Safety Hazard Tracking system.

Figure 3. Roadmap for System Safety and Health Requirements Under DoD 5000.2-R

Hazardous Materials Management USAF Guidance

1. AFI 32-7086 (currently undergoing revision)
 - ➡ Section 2.7.1, Single Manager responsibilities to include contractual requirements for contractors operating on USAF installations to report hazardous material usage to the installation HAZMART.
 - ➡ Chapter 3, Weapon System Hazardous Material management, that includes metrics for Programs to track.
 - ➡ Section 4.9.2, Single Manager Ozone Depleting Substance (ODS) responsibilities.
 - ➡ Chapter 5 (**new chapter being added to revision to AFI 32-7086**), Hazardous Aerospace Materials Mishap Emergency Response (HAMMER) requirements for Programs to provide inputs to the Air Force Civil Engineering Support Agency (AFCESA) for inclusion in Technical Order (T.O.) 00-105E-9, "Aircraft Emergency and Rescue Information."
2. National Aerospace Standard (NAS) 411, Hazardous Materials Management
 - ➡ Programs should have a hazardous materials management effort in place that is consistent with the NAS 411 requirements and that defines the government-contractor teaming on hazardous materials management and decision-making.
 - ➡ Programs MUST obtain a waiver to the SAF/AQ Policy 99-1, "Using Specifications and Standards," before putting NAS 411 on contract. However, Programs can avoid the waiver requirement by requiring a contractor to have a hazardous materials management program that is consistent with NAS 411. When taking this approach, Programs should also use NAS 411 as source selection evaluation criteria.



Key Hazardous Materials Management Considerations for USAF Programs

1. Hazardous materials should be included in the overall Hazard Tracking of the Program.
2. Both a contract that requires the use of a Class I ODS and a contract where the contractor has to use a Class I ODS to perform the contracted work require a Senior Acquisition Official (SAO) approval in accordance with AFI 32-7086, chapter 4, prior to contract award.
3. Program Offices for existing weapon systems are required to eliminate existing requirements for Class I ODS usage in the operation and maintenance of the systems only when there are technically AND economically feasible alternatives that do not increase the environmental, safety, and health risks (as compared to the use of the Class I ODS).
4. The Air Force has sufficient supplies in the Defense Reserve of all Class I ODS to support all existing weapon system requirements, except for the Halon 1202 requirements. This is a result of contamination in recovered Halon 1202 supplies that has made those supplies currently unusable. The three USAF systems that require Halon 1202, the C-130, the C-141, and the C-5 are either converting to Halon 1211 as the least expensive and quickest solution or will phase out of the inventory before the Halon 1202 supplies are depleted.
5. The Air Force has taken the position that the chemical CF3I is not an acceptable halon alternative because of cost, performance, and toxicological concerns.

Figure 4. Roadmap for Hazardous Materials Management Requirements Under DoD 5000.2-R

NEPA USAF Guidance

1. 32 CFR 989, the USAF Environmental Impact Analysis Process (EIAP) (**This CFR supersedes the current EIAP AFI 32-7061).**
 - ▶ 32 CFR 989.3(c)(3), Single Manager Acquisition Program Responsibilities
 - ▶ 32 CFR 989.3(d), Proponent Responsibilities
2. Shipley Group training courses (developed with input from the Air Force)
 - ▶ "Applying the NEPA Process within DoD Acquisition Programs"
 - ▶ "How to Manage the Environmental Impact Analysis Process (Air Force specific)"
 - ▶ "Reviewing NEPA Documents"
 - ▶ "Overview of the NEPA Process"



Key NEPA Considerations for USAF Programs

1. Program Offices should involve the key Headquarters Air Force (HAF) offices (SAF/AQR, SAF/GCN, and HQ USAF/ILE) early in the NEPA planning process.
2. Program Offices should obtain HAF concurrence on the Description of Proposed Action and Alternatives (DOPPA) before preparation of a NEPA document. This is a critical step toward insuring that a Program can effectively and efficiently develop a NEPA document that can successfully support HAF final approval of the Finding of No Significant Impacts (FONSI) associated with an Environmental Assessment (EA) or the Record of Decision (ROD) associated with an Environmental Impact Assessment (EIS).
3. Program Offices should insure that Program Office personnel are actively involved in, and are in direct control of, the EIAP process.
 - ▶ Trying to contract out total NEPA document development responsibility typically generates problems for a Program trying to gain HAF approval.
 - ▶ Normally, existing Program documentation and data (e.g., Acquisition Strategy, Master Program schedule, trade studies, and hazard analyses) contain much of the system specific technical data needed in a NEPA document.
 - ▶ The formal NEPA analysis will also address the potential site specific impacts involving land use, air quality, water resources, safety and occupational health, hazardous materials and waste, biological resources, cultural resources, socioeconomics, and airspace.
4. Program Offices should insure that their NEPA documents specifically address the issues of Air Conformity, Noise (Community and Occupational), Threatened and Endangered Species, and Environmental Justice.
5. Program Offices should provide, as the USAF standard practice, a minimum of 30 calendar days for public review and comment for their EAs. (Note that the regulations governing EISs require longer and more formal public input periods than required for EAs.)
 - ▶ Program personnel, not just contractor personnel, should review all public inputs and decide how to respond to each input.
 - ▶ Program Offices must document all public inputs in the NEPA document, regardless of whether the public submitted the inputs formally or informally, in writing or by electronic mail or by telephone or verbally in public meetings. The Program NEPA document should also include the Program's responses to each public input.
6. Program Offices must insure that their AFMC Center Environmental, Safety, and Occupational Health Committee (ESOHC) reviews and approves the final document, and that HQ AFMC CE and JA review the final document, prior to submitting it to SAF/AQR.
7. Program Offices responsible for either new system development or for existing system modifications are typically the proponents for NEPA documentation covering the Test and Evaluation Master Plan (TEMP) and specific developmental testing activities at specific locations.
8. Program Offices are typically not the proponents for actions such as operational testing, training, and basing. However, Program Offices must support the proponent organizations for those actions in the development of NEPA documents covering their systems.
9. As part of the formal NEPA analysis process, Programs should start with and include the System Safety Hazard Tracking process in the identification of potential NEPA ESOH issues.
10. SAF/AQR is the approval authority for those NEPA documents (Categorical Exclusions (CATEX), FONSI, and ROD) for which a Program Office is the proponent.
11. SAF/AQR does not consider any of the available USAF CATEXs to be applicable to a Program's proposed actions, because most Programs involve either new technology or the use of hazardous materials (See 32 CFR 989, Appendix B, Section A2.2 Additional Analysis).

Figure 5. Roadmap NEPA Requirements Under DoD 5000.2-R

Lt. Col. Sherman Forbes, SAF/AQRE submitted the information presented in this article.♦

F-22 COMPLIES WITH THE KEY COMPONENTS OF THE DOD 5000.2-R

The United States Air Force has made a conscientious effort to incorporate Environmental Safety and Health (ESH) issues into the systems engineering process. Section 4.3.7 of DoD 5000.2-R requires that every Acquisition Strategy include a programmatic ESH evaluation, which is typically included in the Single Acquisition Management Plan (SAMP). Every program, regardless of its acquisition category must integrate ESH issues into the system engineering process. There are five interrelated regulatory categories for environmental regulation: National Environmental Policy Act (NEPA), Environmental Compliance, System Safety and Health, Hazardous Materials, and Pollution Prevention. This issue of the MONITOR provides an overview of how the F-22 complies with the requirements established in the DoD 5000.2-R.

The ESH team consists of the F-22 System Program Office, F-22 Combined Test Force (CTF), Air Combat Command, Air Education Training Command, F-22 Weapon Systems Contractors, F119 Engine Contractor personnel, Pratt and Whitney and other agencies as needed. By implementing the *Site Activation Plan, Programmatic Environmental Safety and Health Evaluation (PESHE)* and *Hazardous Materials Program Plan (HMPP)* documents, the F-22 has a detailed programmatic ESOH plan to follow (see related article on [page 8](#)). The objective of the F-22 program is the successful integration of ESH 5000.2-R regulations into the systems engineering process. This article provides a summary of the general requirements for compliance with DoD 5000.2-R.

General Requirements

The following lists general ESH regulatory requirements and the

method the F-22 program has utilized in order to comply.

NEPA

NEPA requires that all Single Managers(SM) consider the environmental impacts of their actions before they act. All mitigation activities identified must be funded before any action is taken. The F-22 has met this hurdle by implementing the Environmental Impact Analysis Process (EIAP) approach. For further details, see related article on [page 8](#).

Environmental Compliance

Environmental Compliance regulations require that all SM assess current and future ESH laws and regulations that may impact their programs. In order to minimize associated environmental impact costs and incorporate ESH on a System Engineering level, the F-22 has implemented the Environmental and Health Working Group (E&HWG). The E&HWG consists of personnel from the prime contractor (Lockheed-Martin), SPO, using command, flight test center, depots, laboratories and other functions (i.e. contracting, logistics etc). For further details, see related article on [page 9](#).

System Safety and Health

System Safety and Health requirements are vital to the safety of those who work with the aircraft and to the well being of the aircraft itself. All SM must determine system safety needs as well as health hazards that may affect maintenance crews or pilots. Risk levels are defined and managed so that the probability and the severity of a hazard is understood and properly mitigated throughout the life cycle of the weapon system. The AF requires that the F-22 program provide a group of system safety personnel with direct F-22 experience and other related aircraft experience, (i.e. maintenance crews and pilots) in order to meet an acceptable

standard of safety. For further details, see related article on [page 10](#).

Hazardous Materials Management

Hazardous materials programs require that all SM establish a hazardous materials management program in order to proactively eliminate reliance on hazardous materials. The goal of the Hazardous Materials Program Plan (HMPP) for the F-22 is to take a system engineering approach at eliminating and/or reducing non-compliant materials throughout the life cycle of the weapon system. The HMPP CDRL document establishes the criteria for all hazardous materials and waste for the F-22 program. The implementation of the Environmental Hazardous Materials Control working group provides a forum for HM information exchange and guidance for the F-22 program. For further details, see related article on [page 11](#).

Pollution Prevention

Pollution Prevention is handled by following the P2 process. When designing, manufacturing, testing, operating, maintaining, or disposing of systems, where feasible, all types of pollution shall be eliminated or recycled in an environmentally conscience manner. The implementation of the PESHE provides a programmatic plan for compliance. For further details, see related article on [page 13](#).

By taking these proactive steps the F-22 program has achieved success in meeting the requirements of the DoD 5000.2-R. The PESHE, Site Activation Plan and the HMPP, documents are living and changing in order to meet applicable local, state, and federal laws and regulations.

For further information regarding this article, please contact Mr. Perry Beaver, F-22 Program Office, DSN 785-4976 ext. 2230.♦

DOD 5000.2-R COMPLIANCE DOCUMENTS FOR THE F-22 PROGRAM

Site Activation Plan

The Environmental, Safety, and Health section in the Nellis Site Activation Plan describes all federal, state, and local ESH requirements for the beddown and operation of the F-22 weapon system. The plan lists guidelines for managing environmental permitting, hazardous materials requirements, occupational health, ESH facilities and equipment design requirements in order to comply with the National Environmental Policy Act (NEPA). The goal is to significantly reduce the risk associated with environmental impacts during beddown actions.

F-22 Programmatic Environmental, Safety, and Health Evaluation (PESHE)

The Programmatic Environmental Safety and Health Evaluation (PESHE) document describes the System Program Directors' strategy for meeting ESH requirements, in accordance with DoD 5000.2-R. The PESHE establishes responsibilities and identifies how progress will be tracked in order for the F-22 program to comply with NEPA, Environmental Compliance Regulations, Pollution Prevention, System Safety and Health as well as Hazardous Materials issues. These ESH issues are integrated into the System Engineering process by the PESHE.

Hazardous Materials Program Plan (HMPP)

The Hazardous Material Program Plan (HMPP) includes the concerns for the manufacture, operation, repair, maintenance, support, and disposal of hazardous waste materials over the life cycle of the weapon system. The objective of the F-22 Hazardous Materials Program is to ensure that hazardous material associated ESH concerns are identified, controlled and mitigated during the Engineering and Manufacturing Development (EMD) by the F-22 Team. This team includes the Air Force, Lockheed-Martin (LM-Aero), Boeing, and in the design, manufacture, operation, repair maintenance, support, and disposal phases of the weapon system. The HMPP also includes environmental compliance and hazardous materials concerns for F-22 sub-contractors and supplier.

For further information regarding this article, please contact Mr. Perry Beaver, F-22 Program Office, DSN 785-4976 ext. 2230.◆

THE F-22 PROGRAM EFFORTS TO MEET NEPA REGULATIONS

The National Environmental Policy Act (NEPA) requires that the F-22 program consider the environmental impact of their actions. The policy mandates that all Single Manager's analyze the risk and subsequent mitigation associated with their activities. HQ Air Combat Command is using the Environmental Impact Analysis Process (EIAP) approach to identify and mitigate the risks of potentially significant environmental impacts associated with all beddown activities (including training and maintenance). The F-22 complies with NEPA by implementing internal regulation that provides decision authority with the milestones and status for each planned analysis. The ESH section of the Nellis Site Activation Plan is one of the documents that outlines how the F-22 program complies with NEPA regulations. The Nellis Site Activation Plan was developed in part based on the lessons learned during testing at Edwards AFB. Details related to the F-22's Site Activation plan and a success story to mitigate air emission requirements are summarized below.

Site Activation Plan for Nellis AFB

Several issues concerning NEPA regulations are addressed by the Site Activation Plan for Nellis AFB and include the following:

- Permitting Requirements - authority for construction and operations for various air emissions units.
- Hazardous Materials Licenses - hazardous materials shall be licensed with base pharmacy.
- Industrial Hygiene Surveillance - includes personal protective equipment for occupational hazards such as NDI operations or noise emitters.
- Solid and Hazardous Wastes (Classified, Non-Classified) - solid and hazardous waste streams for the F-22 have been identified and characterized.

In order to comply with NEPA regulations at Nellis AFB, the F-22 program must be aware of local Clark County requirements on emission. Under Title V, permits are required for the authority to "construct" and "operate" for various emissions units. Processes that are likely to need permits are paint booth inserts, mechanical sanding units, and emergency generators. Repair facilities such as, the Composite repair facility will need permits as well. Overall construction can start once a permit is obtained from Clark County Air Pollution Control District.

Recent Success Story

In order to meet specific permitting requirements and lower the VOC's associated with spray technologies, LM-Aero, in conjunction with the Air Force has developed a unique brush-roll repair process. The goal of this process is to remove the need for emissions permits typically required during the spray repair processes. Brush-roll techniques are utilized for the repair and touch-up of paints during maintenance cycles at Nellis. This process

removes the air emission concerns typically caused by VOC's during the spray repair process. By utilizing the brush-roll repair technique the VOC content of the paint operation has been lowered by 25%. LM-Aero and the F-22 program are continuing their efforts to reduce VOC's by the use of exempt solvents.

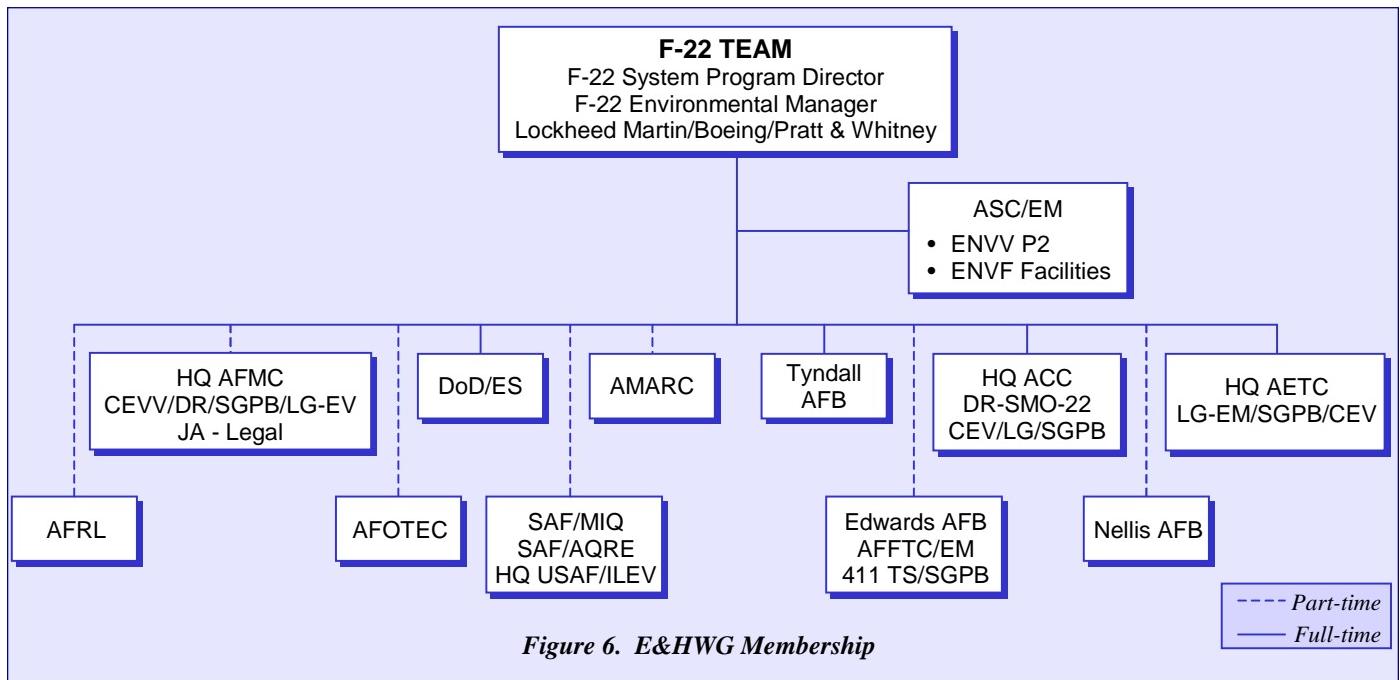
Conclusion

To support the actions required in the EMD phase, the Program Office conducted the NEPA analytical thought process and documented their Environmental Assessment results. The SPO continues with the NEPA thought process throughout the weapon system life cycle. Documentation and evaluation of all environmental impact and subsequent mitigation steps are continually recorded and maintained. The F-22 System Program Director forwards a final copy of NEPA documentation for the ACAT I programs to the Defense Technical Information Center for Archiving.

For further information regarding this article, please contact Mr. Perry Beaver, F-22 Program Office, DSN 785-4976 ext. 2230.◆

THE SUCCESSFUL INTEGRATION OF ENVIRONMENTAL COMPLIANCE ON THE F-22 PROGRAM

Environmental regulations are a source of restriction or constraints that must be identified and integrated into a program. As defined by the requirements of the 5000.2-R, the F-22 shall meet the requirements specified within state, local, and federal regulations. Hence, the systems engineering approach utilized by the F-22 is vital to the compliance of the program. The F-22 program has taken a proactive approach to meeting environmental compliance regulations. The SPO established the Environmental and Health Working Group (E&HWG) as shown in Figure 6. Team members include the user, prime contractor and other system critical advisors (logistic, test, etc). This article will address only those functions associated with environmental compliance.



The E&HWG truly depicts the push towards taking the systems engineering approach to eliminating Environmental and Health hazards. The E&HWG examine new and pending environmental regulations to analyze the impact these regulations might have on the program's life cycle cost, schedule and performance. The cost Oriented Resource Estimate model is run to develop operation and support cost. The E&HWG consider source reduction, recycling, and other actions to reduce the associated impact with environmental compliance at the operating installations and depots. The E&HWG meetings are held at least twice a year, on a rotating basis among members' facilities and the team participates in bi-weekly telecommunications. The goal is to realistically determine how the materials, processes, maintenance etc. associated with the program affect environmental and health issues and mitigate the associate risk before implementation.

Success Story

Selected coatings for the F-22 program are reviewed for compliance to local, state, and federal environmental regulation. Solvents in these coatings are constantly examined for their environmental and health impact. The F-22 is currently looking for ways to reduce high VOC's solvents in their specialty coatings. The E&HWG plays an integral part in this process, in that it allows the prime contractor the ability to work with the customer in the development of replacement materials (solvents). Recently selected coatings are being studied to reduce VOCs for specialty applications.

For further information regarding this article, please contact Mr. Perry Beaver, F-22 Program Office, DSN 785-4976 ext. 2230.◆

OVERVIEW OF SYSTEM SAFETY ISSUES FOR THE F-22 PROGRAM

The F-22 System Safety program, as defined in the Programmatic Environmental, Safety, and Health Evaluation (PESHE), identifies and evaluates system safety and health hazards. It also establishes a safety program to manage the probability and severity of all hazards associated with the development, deployment and disposal of the weapon system. Health hazards can be defined as any condition that create a significant risk of death, injury or chronic illness, disability and or reduce job performance of personnel who produce, test, operate, maintain, or support the weapon system. This article summarizes the aspect of system safety issues that pertain directly to the safety of the air vehicle. Health issues will be further defined in the Hazardous Materials Program Plan (HMPP) section of the Monitor ([see page 12](#)).

SYSTEM SAFETY PROGRAM

The System Program Office (SPO) manages the implementation of the F-22 System Safety Program while the contractor maintains and updates the tasks that are applicable to the Engineering Manufacturing Development (EMD) and production phases of the program. The F-22 safety team consists of both government and contractor personnel. This team is an integral part of all design Integrated Product Teams (IPT) (Figure 7). A tool used by the safety team is the System Safety Group (SSG). The SSG

is an Air Force mandated process for ACAT-1D programs. The SSG is comprised of safety experts from other Air Force agencies such as HQ Air Force Space Command and HQ Air Force Material Command. The SSG brings program safety lessons learned from other weapon systems and insight from both pilots and maintenance personnel representing the primary user. This proactive approach to System Safety has benefited the overall program by giving safety insight early on in the design process and continued oversight as to the programs progresses. This approach aids the F-22 in incorporating the System Engineering process to safety issues. The result of the SSG is an overall reduction of the impacts associated with cost and schedule while maintaining safety risks at an acceptable level throughout the total weapon system.

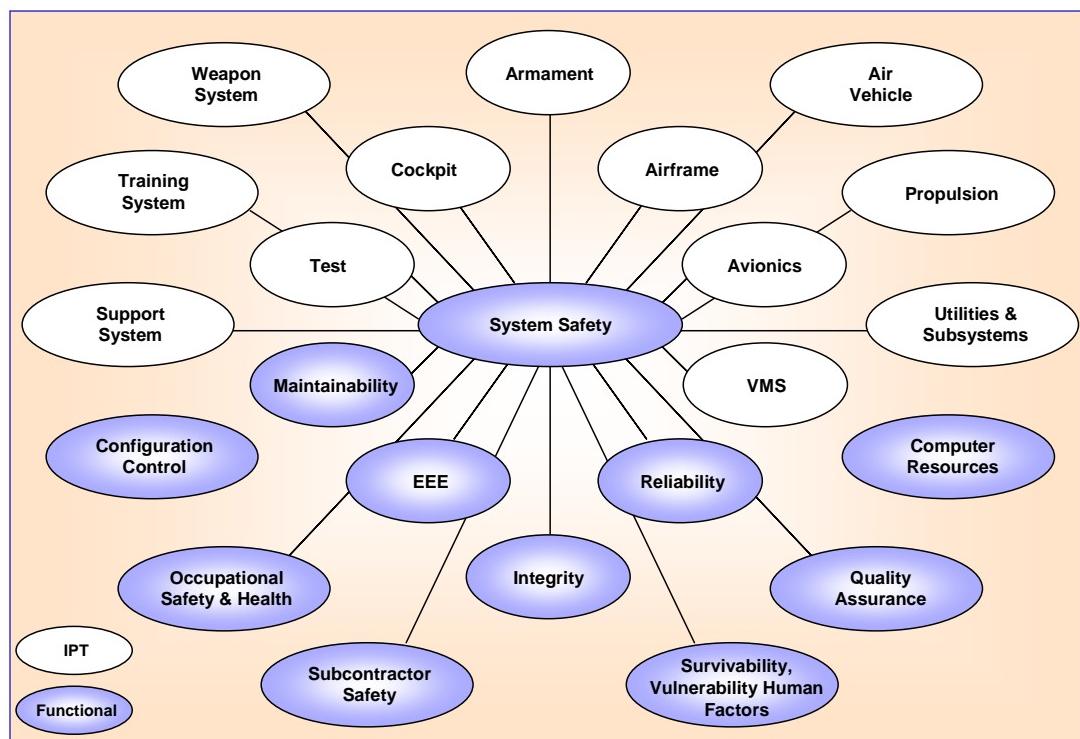


Figure 7. Safety Integrated into All IPTs

Safety Critical Functions (SCF)

The Safety Critical Function process is a unique aspect to the F-22 program. The SCF process is based upon the F-22 Integrity Program which was designed to identify SCFs by past mishap experience, lessons learned, and the concerns of the pilots. Gathering this information resulted in a list of air vehicle functions that were considered primary functions (entitled safety critical functions) and requires additional design emphasis. The IPT, along with its corresponding system safety engineer identified the criticality of components based on failure modes and the potential adverse effects to sub-system and overall weapon system. F-22 parts are now defined as Safety Critical, Mission Critical, Durability Critical, and Durability Non-Critical. By assigning criticality, the F-22 System Safety Team developed the following three definitions to categorize the SCF:

- Safety Critical Function – a function performed incorrectly or not performed, may result in death, loss of the system (air vehicle), severe injury, severe occupational illness or major system damage.
- Safety Significant Item (SSI) – an item that contributes to a SCF.
- Safety Critical Item (SCI) – an item which contributes to a SCF and whose failure alone may result in death or loss of the air vehicle.

Each component failure mode is analyzed for its effect upon the SCF. All hazards related to SCIs SSI are entered into the F-22 Hazard Analysis. The identification of components as SCI or SSI (hardware or software) determine its design requirements.

Figure 8 represents how the safety team categorizes Safety Critical Functions.

F119 Engine Program

The System Safety program for the F119 engine program was developed to evaluate the engine as a total system to include support system, training system and airframe integration. Engine hazards are assessed and the risk levels are evaluated to reflect a weapon system that incorporates a level of airframe hazard controls. The air vehicle hazard analysis includes both engines, fire detection/suppression, and flight controls, all of which may reduce the severity of the engine hazard.

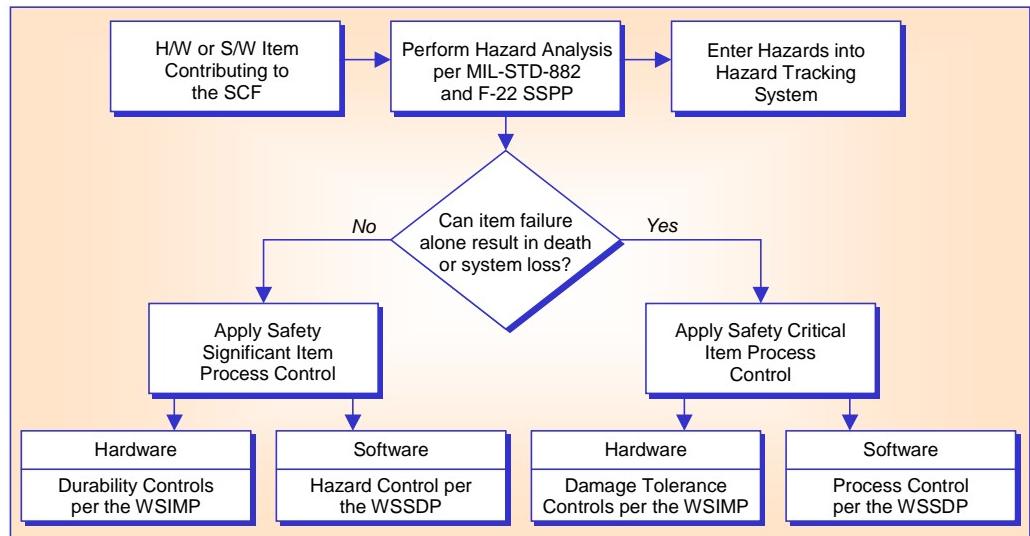


Figure 8. Categorization of Safety Critical Functions

Risk Assessment F119 Engine Program

Risk is determined for the individual hazard by comparing the frequency of occurrence to the "hazard severity". The risk is then given a numerical designation (Hazard Risk Index). Once the risk assessment is complete the acceptability of the hazard shall be determined by using the criteria defined in the F-22 System Safety program i.e. safety critical function.

Conclusion

By implementing the SGG and reporting to corresponding design IPT's the F-22 has taken the necessary steps to ensure the system safety of the F-22 program. By defining SCFs early on, identification of safety issues could be incorporated into the overall design of the weapon system. These proactive approaches to system safety truly represent the system engineering philosophy.

For further information regarding this article, please contact Mr. Bob McAllister, F-22 Program Office, DSN 785-4976 ext. 2405.♦

F-22 PROGRAM COMPLIES WITH HAZARDOUS MATERIALS CONCERNS

In order to ensure that the requirements of the 5000.2-R are met, the F-22 program has developed the Hazardous Materials Program Plan (HMPP). As part of the contractual requirement given by the Air Force, Lockheed Martin and other sub-contractors have worked out a programmatic plan that defines the compliance needs throughout the Engineering, Manufacture and Development (EMD) phase of the F-22 weapon System.

Hazardous materials and processes shall be eliminated or minimized when practical from the air vehicle training and support system. It is imperative that the customer and the prime contractor work in concert when implementing materials and process to the program. If it is not possible to eliminate the hazardous material by design or substitution then the Integrated Product Team (IPT) shall mitigate their use appropriately. Overall the F-22 shall follow the HMPP for design, manufacture, operations, repair, maintenance, support, and disposal over the life cycle of the weapon system.

Hazardous Material

Any material that due, to its chemical, physical or biological nature, causes a safety, public health or environmental concern is considered hazardous. These materials are prioritized by the severity of the impact to the Air Force Pollution Prevention and ESH efforts. Hazardous materials are prioritized as follows:

- Materials not common to standard aerospace manufacturing
- Chemical production and use reduction goals established by regulation
- Large quantity use
- Severe use restrictions by environmental, health and safety regulations
- Materials having significant hazardous material life cycle cost requirements.

Support Organizations

Since it is imperative that the F-22 contractors and Air Force work as a team, the prime contractor (LM-Aero) has identified in the HMPP the support organizations needed to make hazardous materials compliance a successful integration into the program. These organizations are interrelated and have been discussed in previous articles. Additionally, the following organizations all play a part in the HMP.

- System Safety – organization designed to ensure safety of flight and maintenance.
- Integrated Product Teams – responsible for the implementation of control measures for the F-22 concerns.
- Hazardous Materials Review Board – a team from LM-Aero and Boeing etc. that shall review materials to identify environmental compliance and hazardous materials requirements issues.
- F-22 HMP Contractor Integration with Air Force – this includes the Air Force Focal Point with in the System Program Office (SPO) for System Safety, AF Logistics Base Coordination, Special Projects, and Environmental Hazardous Materials Control Working Group.

Success Story

In order to meet upcoming and current regulations for hazardous materials, the F-22 Materials and Processes department from LM-Aero continues working on projects that will ensure compliance. By working through the HMPP Focal point for Lockheed and the Air Force are able to determine what projects are to be funded. For example, the F-22 program is working to eliminate chromated primers from the weapon system; chromated primers propose a serious health hazard as defined by the HMPP. Currently LM-Aero is working on the development of non-chromated primers for the outer mold line of the F-22. Four primers are currently in the testing phase. These replacement primers are evaluated for properties such as fluid compatibility, adhesion, and cure rates.

The project has been prioritized and the success of the project clearly illustrates how the F-22 complies with the regulations of the 5000.2-R.

For further information regarding this article, please contact Mr. Perry Beaver, F-22 Program Office, DSN 785-4976 ext. 2230.♦

F-22 PROGRAM POLLUTION PREVENTION METHODS

Pollution Prevention (P2) actions help to lower the life-cycle costs associated with environmental compliance issues of a weapon system. It is necessary that the program, whenever feasible, reduce or prevent sources of pollution during the design, manufacture, test, operation, and maintenance of the weapon system. In cases where elimination or reduction are not possible recycling techniques are employed. Disposal of material or releases to the environment are performed only as a last resort and must be conducted in an environmentally safe manner. The F-22 program utilizes P2 techniques as outlined in the PESHE to help target potential pollution issues.

Programmatic Environmental Safety and Health Evaluation (PESHE)

The PESHE details the responsibilities of the System Program Director (SPD) in order to establish a pollution prevention program. The SPD must identify the impacts of the system on the environment, wastes released to the environment, ESH risks associated with using new technologies, and any other information needed to provide source reduction and recycling opportunities. When developing work statements, specifications, and other product descriptions, the F-22 program considers waste prevention, life cycle costs, use of environmentally friendly products, and disposal as appropriate.

Success Story

The F-22 Halon 1301 Elimination Project was initiated by the Program Office in Mid-FY 95. The goal was to reduce the only remaining use of Class 1 ODS in the life cycle of the F-22. An ODS waiver was needed for EMD aircraft excluding 4009. A request to use Halon 1301 for EMD aircraft was submitted for approval. The F-22 program worked with Air Force Research Laboratory (AFRL) to develop design equations of engine nacelle and dry bay simulators and to test proposed Halon substitutions, such as HFC-125. Based on testing the F-22 program selected HCF-125 as the alternate and is scheduled to be installed on aircraft 4009.

Conclusion

The objective of the SPD is to establish a P2 program that helps to minimize environmental impacts and life cycle costs associated with compliance. Implementation of the PESHE has helped to define goals and responsibilities for the program. The F-22 P2 success has resulted from the effective integration of Environmental Safety and Health considerations into the systems engineering process.

For further information regarding this article, please contact Mr. Perry Beaver, F-22 Program Office, DSN 785-4976 ext. 2230.♦

USE OF RADIOACTIVE MATERIALS IN WEAPON SYSTEMS: COST AND ENVIRONMENTAL, SAFETY, AND HEALTH (ESH) CONSIDERATIONS

Many aircraft components contain small quantities of radioactive materials. Acquisition professionals should be aware of the regulations governing these materials and understand which components contain radioactive materials. Air Force policy also dictates that the use of radioactive materials be minimized and that total lifecycle cost be factored into any acquisition decision. While in some cases initial procurement costs may be less for use of a radioactive component, the high cost and regulatory burden associated with handling, storage, and disposal often outweigh the initial cost savings. If no feasible alternatives exist to the use of radioactive materials in systems, inclusion of Air Force radiation safety and licensing experts early in the procurement process often saves time, prevents violations, and ensures smooth deployment of the system to field units.

Several agencies regulate radioactive materials. The Nuclear Regulatory Commission (NRC) granted a Master Material License to the Air Force for use of radioactive material. Under the license, the Air Force is given authority to manage those radioactive materials that the NRC regulates. The Air Force Radioisotope Committee (RIC), located within the Air Force Medical Operations Agency at Bolling AFB DC, issues individual permits for the use of radioactive material at Air Force installations. NRC guidance is found throughout Title 10 Code of Federal Regulations, "Energy", parts 0 to 199. There are three types of NRC authorizations (specific license, general license, and exempt distribution, where in no license is needed) and two types of Air Force radioactive material permit categories (specific, general). Air Force organizations must secure a permit from the USAF Radioisotope Committee (RIC) before receiving, storing, distributing, using, transferring, or disposing of radioactive materials as defined in AF 40-201, Managing Radioactive Materials in the Air Force. AFI 40-201 governs each of these activities plus incident management and reporting. RIC is maintained by the Surgeon General (HQ USAF/SG) and is under the direction of the Air Force Medical Operations Agency. The Department of Transportation (DOT) regulations establish criteria for the safe transport of radioactive materials. These regulations are found in Title 49 CFR Part 171 through 178 and are cross referenced in the NRC's 10 CFR part 71. The Environmental Protection Agency's (EPA) Radiation Protection Programs impose limits on radiation exposures, levels, concentrations, or quantities of ra-

dioactive material received by members of the public. EPA also has joint authority with NRC over the disposal of low level radioactive material mixed with hazardous waste (40 CFR Part 261).

A wide variety of products used at Air Force bases contain radioactive materials including chemical agent alarms, self-luminating exit signs, smoke detectors, and medical products. Figure 9 provides examples of radioactive materials contained in weapon systems.

Item (Weapon System)	Isotope	Comment
Nucleonic Oil Gauge (C-5, F-111, F-106)	Krypton 85	Exempt from Licensing
Inflight Blade Integrity System (IBIS) (H-53)	Strontium 90	Specific License
Lensatic Compass	Tritium (Hydrogen 3)	General License
Lantrin Pod (F-16)	Americium 241	Specific License
Counterweights (C-141, C-5)	Depleted Uranium	General License for Use and Possession; Machining or Modification requires Specific License
GAU-8 Armor Piercing 30mm round (A-10)	Depleted Uranium	Specific License
Light Antitank Weapon Sight	Promethium 147	Specific License
Magnesium Thorium (MagThor) Structural Components (Many Aircraft and Missiles)	Thorium 232	Exempt from Licensing for Use and Possession; Machining or Modification requires Specific License

Figure 9. Common Radioactive Items in the Air Force

Several incidents of improper management and disposal of radioactive materials have occurred in the past. In some cases, recycling or disposal companies have discovered radioactive materials in scrap metal that they received from Air Force bases. The remediation and disposal costs associated with radioactive wastes can be very high. One way to prevent such incidents in the future is for acquisition managers to minimize the use of radioactive materials during the design process. Acquisition staff should consider the use of exempt distribution components or non-radioactive items. In fact, USAF's radioactive material acquisition policies include: 1) acquisition of radium or devices containing radium is prohibited, 2) radioactive material can not be accepted into the USAF inventory unless an USAF permit issued by the RIC exists or the material is exempted from permit requirements by the RIC or AFI 40-20 1, 3) systems using radioactive materials must have radiation safety features built-in by design, 4) radiation safety requirements must be specified in all contracts awarded for operating, changing, and repairing systems containing radioactive materials. For further information, contact Major William Hoak, DSN 787-2618, HQ AFMC/SGBR.

This article was submitted by Major Hoak, HQ AFMC/SGBR. ♦

WEAPON SYSTEM POLLUTION PREVENTION OPPORTUNITY ASSESSMENTS

Air Force Material Command's (AFMC's) sustainment mission, with its associated industrial type activities, presents complex and diverse environmental challenges that directly impact the life cycle cost associated with AFMC's other mission, weapon system acquisition. In order to comply with Environmental, Safety, and Occupational Health regulations, AFMC enacted the strategy of Compliance through Pollution Prevention (CTP2). CTP2 targets pollution prevention (P2) investments that will provide a return through compliance and mission benefits. The goal of this strategy is to show the total ownership cost (TOC) to a program and the direct benefits seen through the P2 approach.

AFMC is performing Pollution Prevention Opportunity Assessments (P2OAs) at installations for processes at risk of high compliance burdens. High burden processes are usually tied to maintenance or overhaul of a weapon system. The P2 solutions identified by the P2OAs will be evaluated for their potential to reduce overall ESOH burden. The goal of implementing the CTP2 process will be to lower weapon system life cycle costs by applying P2 solutions.

The CTP2 Process

The CTP2 process takes advantage of new technologies and accommodates mission changes to achieve continuous improvement in mission performance, reduction in total operating costs, and reduction in compliance requirements. The

following diagram is a depiction of the “plan–do–check–review” process of an Environmental Management System for the CTP2 process.

Figure 10 depicts the CTP2 Process flow.

A compliance site is defined as any location under Air Force control that becomes subject to current or anticipated environmental regulations. Burden is considered both the cost and risk to maintain Environmental, Safety and Occupational Health (ESOH) factors. Each area for compliance is then grouped by activity or process and prioritized. P2OAs are performed and a solution for reducing the burden or completely eliminating the compliance site is planned by implementing the solution hence, the “do” phase of the diagram is completed. Evaluation of how the P2 solution affected the compliance burden is the “check” and “review” part of the system.

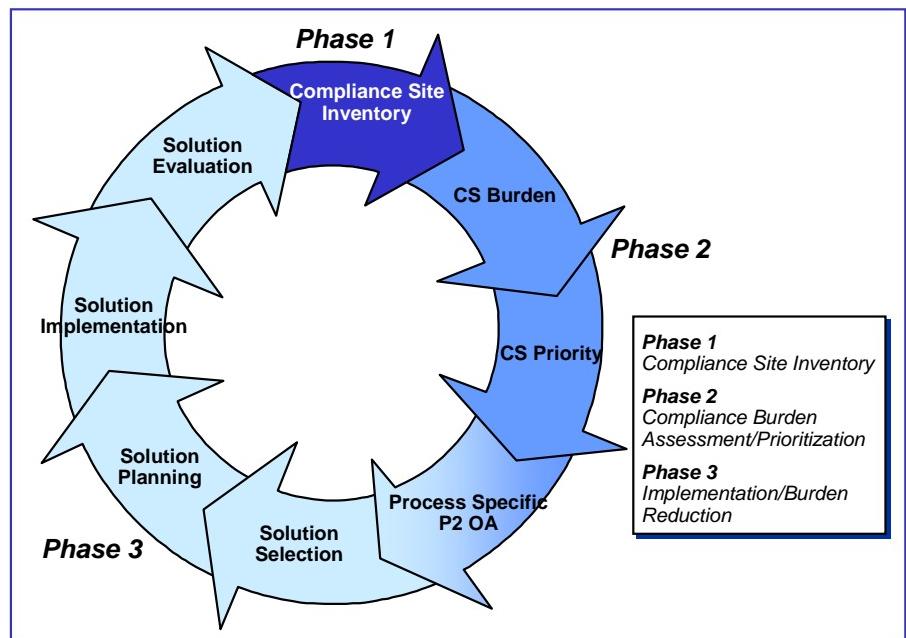


Figure 10. AFMC CTP2 Process Flow Diagram

In the past, Air Force installations have been required to perform P2OAs with the goal of reducing pounds of chemicals used and chemical waste whether or not they posed a compliance cost/liability. The P2OA was refocused to address compliance burden instead of wastestreams and specific chemicals. The P2OA was able to prioritize sites by using ESOH cost and risk data for compliance sites as well as other bases specific issues. P2OAs are then performed on processes that represent the highest aggregate environmental compliance burden. The pollution reduction alternatives are evaluated based on their ability to lower the TOC including compliance burden that provides at least a 5 year return on investment (ROI).

The full P2OA process involves these seven following steps:

1. Determine as much as possible about a process and all its related processes.
2. Put together a team of individuals, who understand how the process runs, this should include Base EM and the process owner.
3. Detail the process and how it fits in the overall installations process flow.
4. Find a process step that has a significant need for environmental improvement and determine the “differential” cost to compare against suggested solutions.
5. Determine the root cause of that problem.
6. Develop a list of potential solutions that include cost considerations, document changes, and process changes.
7. Draft an Action plan that includes the requirements for long and short-term solutions.

Considerations For Processes Affecting Weapon Systems

Often processes involved in the sustainment of a weapon system have high compliance burdens. It is therefore imperative that the Single Manager, process engineer, etc. be part of the P2OA team. TOC must be carefully evaluated over the Life Cycle of a program for those items that might be impacted by potential changes or modifications to the process. This should be assessed during the OA investigation. The ESOH staff, process owner, engineers and Single Managers must be involved in seeking the optimum solution. Their full buy in and support through POMing and planning for implementing that solution is critical. The AFMC P2 Integrated Product Team (IPT) was created in 1993 to provide a coordinated effort between civil engineering, logistics, engineering, laboratory, and acquisition functionals at the HQ level. This IPT has refined its teaming to now include coordination of research programs from initial requirements development through

Demonstration and Validation on into the final implementation. This evolution includes leveraging of all the functional resources along with gaining the technical and fiscal support of both tri-service and outside DoD agencies resulting in a more efficient and robust AF P2 program.

Issues/Benefits

Who will pay for the proposed process change is often an issue. Depending on whether the process affected works multiple weapons systems, single systems, or is a base sustainment operation often gives the initial pointer as to who would be the best funding advocate. However, this determination is made at the beginning of the proposed P2OA since the funding advocates buy in is essential. Often funding is jointly shared between the process and system owners.

Changes made to a maintenance process on a weapon system could influence maintenance activities at installations and in other commands as well. AFMC foresees benefits by performing process specific P2OAs on weapon systems at Test Centers. The goal will be to determine how a new weapon system will be maintained and operated in the field and determine the P2 solutions necessary to mitigate associated costs. By conducting these process-specific P2OA's and using the CTP2 process AFMC installations are able to reduce compliance burden and TOC through out the Air Force.

For further information, please contact Lt. Col. Michael Boucher, Chief Pollution Prevention Branch, HQ AFMC/CEV, Wright-Patterson AFB, (937) 257-7414, Michael.Boucher@wpafb.af.mil.

Source: AFCEE Environmental Quality Resource CD, Weapon System Pollution Prevention Opportunity Assessments.♦

COMPLIANCE THROUGH POLLUTION PREVENTION (CTP2) - SITE INVENTORY, PACAF EXPERIENCE

Since 1992 the United States Air Force has made great strides in achieving environmental regulatory compliance. The Air Force has steadily declined the number of open enforcement actions since 1992. Compliance has been met largely by payment of permitting fees and process treatments. The new focus of the USAF will be to eliminate as many of the sources of pollution as possible. These goals are to be met by targeting pollution prevention (P2) efforts in high risk/high costing compliance areas. The USAF is now actively involved in the compliance through pollution prevention (CTP2) process. The CTP2 is essentially an Environmental Management System (EMS)-based process that preferentially applies P2 solutions to achieve compliance while reducing Total Ownership Costs (TOC), risks, improving performance, and reducing the compliance burden.

Methodology

The Air Force plans implementation of the CTP2 process in three phases. Phase I is the identification of compliance sites on an installation. Compliance sites are sources of pollution that create economical and environmental compliance burdens. Phase II of the process involves site prioritization. Sites are ranked by the recurring compliance cost and risk associated with a compliance burden. Compliance costs are comprised of recordkeeping, permits, waste disposal, manpower, and training costs. Risk assessment is determined by identifying and ranking a realistic worst case scenario for the compliance burden at each site. Phase III of the CTP2 process takes the highest ranked compliance burdens and assesses cost-effective P2 solutions to reduce or eliminate the compliance burden.

HQ Pacific Air Forces (HQ PACAF) Environmental Division hired a contractor in order to complete Phases I and II of the CTP2 process. The team established the tools that would be essential for the success of meeting Phase I and II goals. The primary tool is a user-friendly Microsoft Access database that captures Compliance Site Inventory (CSI) information in the field. The PACAF team was divided into four geographic areas: Alaska, Hawaii/Guam, Korea, and Japan. The database was also tailored to capture unique data requirements, such as above ground storage tanks, hazardous material storage areas, and PCB contaminated transformers.

Data Collection

Collection of data included emissions inventories, water discharge permits, hazardous waste plans, storage tank inventories, and spill plans. Determination of cost to each compliance site was an important factor to the teams' analysis. The

objective was to determine the costs for each site that directly related to compliance. For example: environmental monitoring, facilities, manpower, permits, fees, sampling, analysis, supplies, equipment and training, were all ongoing costs factored into the data collection site. Operations and Maintenance (O&M) and Safety and Occupational Health (SOH) costs that directly related to compliance site environmental programs were determined.

Risk Management Determination

During site visits, inventory teams attempted to determine Operational Risk Management (ORM) rankings for sites. Risk assessment was necessary in order to determine a realistic worst case scenario of an undesired event. In order to determine the severity of the impact to a compliance site the field team generalized the events into 3 categories, negligible, marginal and critical. Critical being where there was a possibility of environmental degradation whereas negligible meant the greatest possible loss was a violation of AF policy (a paper work impact).

Results

Within PACAF the compliance site inventory captured 8563 sites. The top four categories, as shown in Figure 11, for compliance were:

- Hazardous Waste Management (20%)
- Wastewater and storm water (16%)
- Underground Storage Tanks (15%)
- Above-ground Storage tanks (12%)

These numbers are based on the original assessment and are still being refined.

The sites with the highest risk (lowest ORM rating) were Hazardous Waste (ORM8), Hazardous Material Storage (ORM 10), and Drinking water (ORM 11). The overall compliance burden for each category did not vary greatly from its ORM rating.

In general the cost and ORM data for compliance sites were consistent across bases, both overseas and statewide. However the greatest difference is seen in air management sites. An average of 81 air sites were identified across all nine major PACAF, whereas in Japan and Korea 2 and 18 sites were identified. This can be attributed to the Title V permits under the Clean Air Act which the U.S. housed bases are governed by.

Due to this study PACAF now has the ability identify the true compliance burden for each of its bases. The ability to do this will give the base environmental professionals the ability to defend their budgets and target appropriate resources on eliminating compliance sites.

For further information, please contact David Kumar, Environmental Engineer, HQ Pacific Air Forces (HQ PACAF), Hickam AFB, Hawaii, DSN (315) 449-2915, David.kumar@hickam.af.mil.

Source: AFCEE Environmental Quality Resource CD, Article –Compliance through Pollution Prevention (CTP2) – Compliance Site Inventory, PACAF Experience.◆

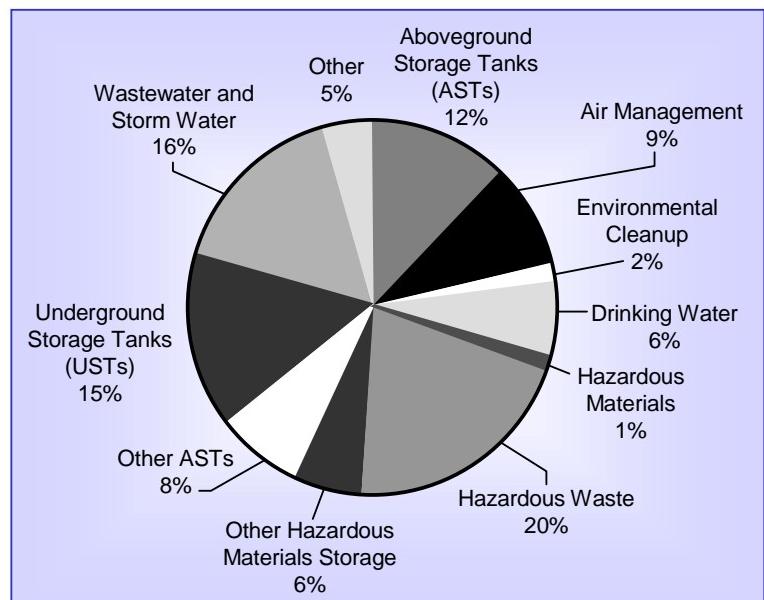


Figure 11. Overview of PACAF Compliance Site Inventory

The MONITOR is planning to transition completely to an electronic format. If you would like to receive notices about the MONITOR through e-mail, please send your e-mail address to heather.l.travis@saic.com

MATERIALS AND PROCESSES FOR POLLUTION PREVENTION PROGRAM (MP4) LASER DECOATING FOR MISSILES PROJECT

Problem

Current decoating alternatives for missiles such as chemical stripping and mechanical stripping results in the production of hazardous and toxic wastes. Methylene chloride, currently used to strip powder paint on missiles, is on the EPA-17 list and is also a hazardous air pollutant (HAP). Decoating processes also produce a chromium waste stream. LASERs (light amplification by stimulated emission of radiation) have been used in industrial settings for welding, cutting, drilling, and surface treatment. The TEA-CO₂ LASER and the Diode LASER were evaluated for decoating missiles.

Project Description

Under this project, LASER technology will be evaluated for paint removal from missiles for insertion at AFP44 in August 2001. The LASER technology will be evaluated for the following parameters:

- verifying coating removal rates (coating type and thickness);
- establishing quality of removal and the cycle time of the process;
- determining the effects of airframe geometry on removal efficiency;
- quantifying the waste stream; and
- evaluating the changes in generation rate of hazardous waste and the release of hazardous materials into the environment.

Constraints have been placed on the new process which include the following:

- not creating new hazardous wastes;
- current waste treatment systems must be adequate;
- no additional personnel required, no major changes in operator skill level, should not require excessive control, and the new process should be less costly.

Results

The Subtask Plan was completed by NDCEE/CTC in March of 2000. A CO₂ LASER demonstration was conducted in August 2000 at NDCEE with the demonstration report scheduled for October 2000. The technology justification report is scheduled to be completed in November 2000.

For further information regarding this effort, please contact Mr. Dick Lantis, ASC/ENVC at (937) 255-3054 ext. 424 or Paul W. Fecsik, Raytheon Company at (520) 794-4105.♦

EXECUTIVE ORDER 13148: GREENING THE GOVERNMENT THROUGH LEADERSHIP IN ENVIRONMENTAL MANAGEMENT

This Executive Order establishes new pollution prevention and toxic release reduction goals and revokes previous orders that have been central to these efforts. EO-12843, EO-12856, and section 1-4 "Pollution Control Plan" of EO-12088 are revoked.

The new EO emphasizes the implementation of "environmental management systems" at the facility level and for the entire agency. The management systems are to include measurable environmental goals, objectives, and targets updated annually and made part of audit protocols.

The EO calls for greater application of "life cycle assessment" and "environmental cost accounting" to make decisions and initiate pollution prevention projects. Environmental cost accounting means "the modification of cost attribution systems and financial analysis practices specifically to directly track environmental costs that are traditionally hidden in overhead accounts..." Although details are not proved, presumably this would include a range of costs such as energy, waste disposal, associated compliance costs, and even illness and injury costs if they could be reliably linked to a particular process or chemical use. The order requires agencies to begin with a pilot program and then apply the principles where feasible.

The order contains many additional mandates (both general and specific) including:

Pollution Prevention (P2)

Both audit programs and funding for regulatory compliance programs shall emphasize pollution prevention as a means to address environmental compliance. A written plan is required of each facility. Existing P2 plans can be modified to meet the requirement.

Emergency Planning and Community Right-to-Know (EPCRA)/Toxic Release Inventory (TRI)

Each agency shall reduce its TRI releases and off-site transfers by 10 percent annually, or by 40 percent overall by December 31, 2006 (based on the aggregate of all facilities). Appropriate Federal Acquisition Regulations (FAR) clauses shall be developed to require that contractors provide agencies with all necessary information. Agencies must use electronic reporting. EPA may monitor compliance with EPCRA portions of this order. EPA will review application of existing regulatory exemptions to TRI reporting.

Use of Selected Chemicals

EPA shall identify 15 or more priority chemicals, and each agency shall reduce its use of the selected toxic chemicals, or its generation of hazardous and radioactive waste types at its facilities by 50 percent by December 31, 2006. An agency may, with concurrence, develop its own list of hazardous or radioactive waste types. The requirement can be waived where an agency has previously reduced the use of a priority chemical by 50 percent. Agencies may undertake pilot projects to make public the facility materials accounting data for the listed chemicals.

Landscape

Agencies shall reduce the adverse impact to the natural environment through the sustainable management of Federal facility lands through cost-effective, environmentally sound landscaping practices and programs. Acquisition and procurement practices must conform to the Guidance for Presidential Memorandum on Environmentally and Economically Beneficial Landscape Practices.

Ozone-Depleting Substances (ODS)

Other agencies will coordinate ODS disposal with the Department of Defense (DoD) and transfer to DoD any materials critical to DoD missions.

Affirmative Procurement

Agencies are encouraged to purchase paper products with environmentally benign (recyclable) pressure sensitive adhesives (consider U.S. Postal Service Qualified Products List).

The Environmental Protection Agency (EPA) Tasking

Convene an Interagency Environmental Leadership Workgroup with senior representatives from all executive agencies. Develop a compliance assistance center for Federal Facilities. Coordinate pilot projects to collect release and waste management information about environmental restoration at facilities and sites.

Source: Currents Navy Environmental News, Summer 2000.♦

INTERVIEW: GREENING THE GOVERNMENT EO13148

Mr. William Garvey works in the Federal Facilities Enforcement Office in the Office of Enforcement and Compliance Assurance at the United States Environmental Protection Agency, Washington, DC. He served as the co-chair of the Interagency Work Group under Executive Order (EO) 12856 and as facilitator of the work group responsible for the development of EO 13148. He is currently the chair of the interagency task force established under EO 13148. Mr. Garvey spoke with the MONITOR regarding EO 13148.

Q. What was the impetus for EPA to establish the new EO 13148 titled “Greening the Government Through Leadership in Environmental Management?” How does it support and/or enhance previous EOs?

A. To the surprise of many, EPA did not initiate this Executive Order; development of EO 13148 was the product of a number of agencies. In the summer of 1997, federal agency representatives, including several from the Department of Defense (DoD), were reviewing the status of implementing EO 12856 and found a clear need for an updated EO.

They produced an outline for a document that would leverage existing environmental management successes across the federal community while supporting and strengthening new opportunities not addressed in existing EO's. Following that outline, the new EO extends to the full federal community successes achieved under EO 12856, the pollution prevention EO and two other EO's; one related to reduction of Ozone Depleting Substances (EO 12843), and another addressing federal agency contractor reporting under the Emergency Planning Community Right-to-Know Act (EPCRA) section 313 (EO 12969).

Q. Can you provide us some details regarding the development of the EO? For example, the development process, stakeholder participation etc.?

A. While the concept of a drafting new EO was initiated in mid-1997, the effort to begin formal review was not started until the summer of 1999. DoD was an active player in this effort and, with other federal agencies, provided significant comments that were incorporated during the OMB formal review process. As I noted, the final product reflected successes and challenges in carrying out existing EO's as well as promising new initiatives not yet implemented across the Federal community. The net result of this effort has been twofold. We are reducing overall burden to the federal government through both elimination of unproductive aspects of the various EO's and creation of a more streamlined EO process as well as supporting more effective and efficient management concepts.

Q. What are the basic concepts upon which this new EO has been developed? How are these concepts similar/different than other requirements already imposed on Federal Facilities?

A. The three basic concepts upon which this EO is based are Pollution Prevention, Community Right-To-Know, and Environmental Management Systems (EMS). The first two concepts, Pollution Prevention and Community Right to Know were fundamental to EO 12856. Pollution Prevention concepts were also a primary factor in EO 12843 and Community Right to Know; particularly contractor TRI reporting responsibilities, was also covered under EO 12969.

The notion of EMSs had its genesis for the Federal community in EO 12856 which called for development of the Code of Environmental Management Principles (CEMP). The framework that was developed under the CEMP is similar to the ISO 14001 EMS framework commonly found in private sector EMSs. Under EO 13148, the advantages of EMSs are acknowledged and fully embraced and federal facilities are directed to incorporate this concept into facility level activities. And, in many cases, Federal facilities are already implementing basic parts of the EMS concept through various efforts such as development of P2 Plans and enhanced materials tracking systems. The requirements of EO 13148 are not substantially different than the executive orders it replaces. The real change is that now facilities have a consolidated road map to follow.

Q. How do you think the requirements under EO 13148 will impact Federal Facilities in general and DoD in particular?

A. Each agency/service has a core mission that is vital to the success of the Federal government. The goal of the EO is to incorporate environmental leadership into that core mission. Several of the DoD services have already recognized the benefits of this approach and have begun implementing environmental management concepts. Facility environmental managers should view the EO as a tool to help them strengthen their programs and any "impact" should be positive. In fact, under the new EO, I anticipate that many DoD facilities will serve as "mentors" to other federal facilities that do not have the breadth and depth of experience in environmental management concepts.

Q. What has been the driver to include establishing an Environmental Management System at federal facilities? How will these systems enhance and improve existing programs?

A. The environmental management successes under EO 12856 were the initial driver behind integrating EMS concepts into EO 13148. These early successes did not come from endorsement of a formal EMS framework such as CEMP or ISO 14000 but reflected facility level recognition of the importance of basic EMS principles such as management commitment. Where facilities actively supported these concepts, environmental leadership became the paradigm. Additionally, there was and still is a clear signal from the private sector that implementing an EMS simply represents good business practice. A large number of private sector companies are implementing EMS

frameworks. For the Federal government, likewise, implementing an EMS will lead to better, more cost effective business practices and will enhance overall mission goals.

Q. What will be the mechanism for federal facilities to fund the requirements of EO 13148 and what should be the priority in allocating resources?

A. The mechanism for funding implementation of the EO requirements will vary by agency. With time, many of the operational aspects of the EO will be incorporated into existing facility planning, using existing mechanisms at the field level. Additionally, preliminary data has shown that implementation of EMS concepts results in cost savings and better efficiency; this has been a real selling point of the EO. In the early phases of implementation, the key may be to learn from successes at other facilities to gain a higher level of comfort and build on those successes.

Q. What additional resources/assistance will EPA provide to support federal facilities comply with this requirement?

A. EPA is currently developing a Compliance Assistance Center, which will be a web based information tool. The Center will be targeted at the facility level where the EO can be effectively implemented. Although the Center is still in development, it can be viewed at <http://www.assistancenter.net>. Other resources available include EPA's field-level federal facility program managers (see Figure 12). Regional program managers serve to help federal facilities comply with a variety of environmental requirements. Additionally, EPA has established an Environmental Management Review (EMR) program. Under this effort EPA personnel will conduct a one- to two-day review of a federal facility's EMS program and provide feedback of conformance to an accepted EMS standard.

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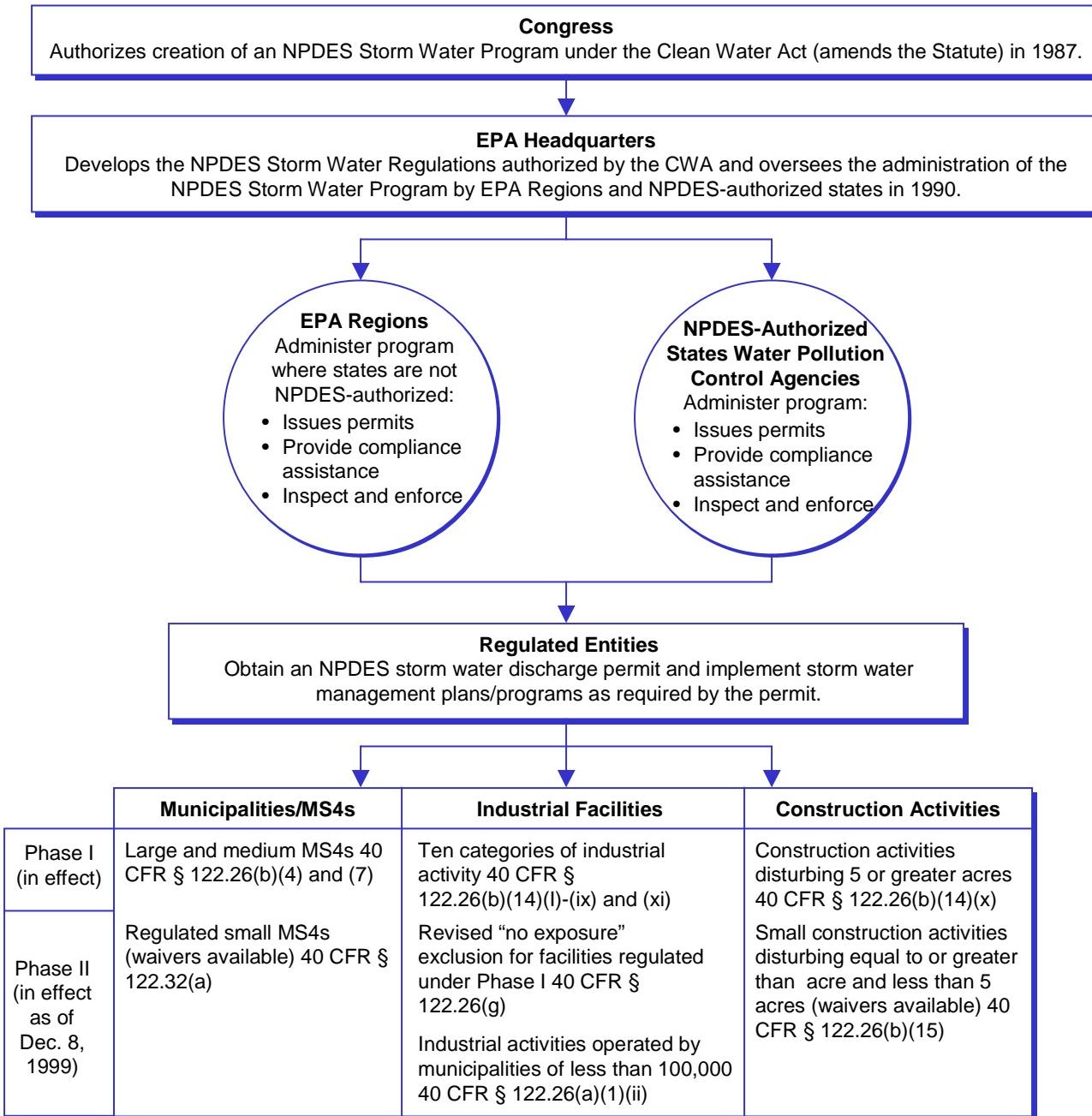
Figure 12. EPA Regional Federal Facilities Coordinators

Q. At an individual level, what steps should an Environmental Manager take to comply with the requirements and/or the intent of the EO?

A. It is critical to first understand what the EO really means both to the facility environmental manager and the facilities environmental program. Environmental managers should examine closely concepts that are new and see where they affect your facility and how you can capitalize on the EO to make your program more effective. Many sections of the EO were specifically written to assist the facility environmental manager in performing his or her duties more effectively at the facility level. It is also important to take steps to incrementally build on previous successes. At the same time it is vital to ensure that whoever "controls" the facility is aware of the new EO - that person's support is important to the success of your program. Make contact with others and learn what they are doing to implement the EO - personnel in both policy and accounting decision making authority and will help ensure that both top-level commitment and resources are available down the road to implement the EO. Likewise, stay aware of developments in areas such as training and priority chemical reductions - much of this information should be available on DENIX. Finally, the EO applies across the Federal community and reflects many of the successes achieved in the DoD services. As such, it is incumbent upon DoD to reach out to other federal facilities. Invite other federal environmental personnel in your area to see what you are doing so they can benefit from it - you may learn something new from them as well.♦

OVERVIEW OF THE STORM WATER PHASE II REGULATIONS

The 1987 amendments to the Clean Water Act (CWA) required a two-phase implementation of a national program for addressing storm water discharge. Figure 13 provides an overview of the Phase I and Phase II of the storm water programs.



All such activities (except airports, uncontrolled sanitary landfills, and power plants) were previously exempted from the original Phase I application deadline.

Figure 13. NPDES Storm Water Program Regulatory Overview

The first phase, Storm Water Phase I rule was promulgated on November 16, 1990 (55 FR 47990). Phase I required all National Pollutant Discharge Elimination System (NPDES) permits for storm water discharges from: 1) "medium" and "large" municipal separate sewer systems (MS4s) serving populations of 100,000 or greater, and 2) 11 industrial activities, including construction activity disturbing 5 acres of land or greater.

The Storm Water Phase II regulations (64 FR 68772) were promulgated on December 8, 1999. These regulations extend the requirements for the NPDES permits to storm water discharges from: 1) "small" MS4s serving populations of less than a 100,000 in an "urbanized" area, and 2) construction activities disturbing equal to or greater than 1 and less than 5

acres of land. Such small MS4s and construction activities are automatically designated as being regulated by this rule. Additionally, Phase II extends the “no exposure” inclusion to all industrial activities covered under Phase I except for construction activity. The regulation also sets a new deadline for permit coverage of municipally-owned industrial activity that has been temporarily exempted from storm water discharge permit coverage.

Table 1 provides a summary of the Storm Water Phase II Compliance dates. Small MS4s and construction activities designated by the rule are required to seek permit coverage by March 10, 2003, unless their NPDES permitting authorities decided a phase in permit coverage and established alternative deadlines. Small MS4s and construction activities designated by the NPDES permitting authority are required to seek permit coverage within 180 days notice by the regulator. By May 8, 2007, NPDES permitting authorities may also phase in coverage for small MS4s with populations of less than 10,000.

Table 1. Storm Water Phase II Compliance Timeline

Activity	Deadline
Conditional “no exposure” exclusion option available in states where EPA is the NPDES permitting authority	February 7, 2000
Submission of “no exposure” certification	Every 5 years
EPA issues a menu of Best Management Practices (BMPs) for small MS4 programs	October 2000
EPA issues a model general permit for small MS4s	October 2000
EPA issues guidance on measurable goals for small MS4 programs	October 2001
NPDES permitting authority determines designation of small MS4s located outside of an urbanized area that serve a jurisdiction with a population of 10,000 density of 1,000/sq. mile	By Dec 9, 2002; or by Dec 8, 2004, if applying designation criteria on a watershed basis under a comprehensive watershed plan
NPDES permitting authority determines waivers for regulated small MS4s in urbanized areas	By December 9, 2002
NPDES permitting authority issues general permits for regulated small MS4s and small construction activity	By December 9, 2002
Operators of regulated small MS4s and small construction activities designated by the rule must obtain permit coverage	By March 10, 2003
Operators of regulated small MS4s and small construction activities designated by NPDES permitting authority must obtain permit coverage	Within 180 days of notice
Temporarily exempted municipal operators of industrial activities must obtain permit coverage [Intermodal surface Transportation Enforcement Act (ISTEA) moratorium]	By March 10, 2003
The NPDES permitting authority may phase in coverage for small MS4s serving jurisdictions with population of less than 10,000 on a schedule consistent with a state watershed permitting approach	Completion of phase-in by March 8, 2007
The regulated small MS4s must fully implement their storm water management programs	By the end of the first permit term - typically a 5-year period
Re-evaluation of the Phase II small MS4 regulations by EPA	By December 2012
NPDES permitting authority determination on a petition for designation of a non-regulated storm water discharger	Within 180 days of receipt

This information is found in the Department of Defense Implementation Guidance for Storm Water Phase II Regulations on denix at <http://www.denix.osd.mil/denix/DoD/working/CWASSC/comments/comments.html>.◆